

# TQM Volume-4

## Total Quality Management in Factory Management

### *Thinking Environment*

2023a Edition

Kouichi (木村 紘一) Kimura



Factory Management Institute

COOPERATING TO REACH EXCELLENCE



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**Kouichi (木村 紘一) Kimura Sensei:** International Consultant of the TPS (Total Productive System), TQM, TPM (Total Productive and Total Preventive Maintenance), Kaizen, and Factory Management. Expert in the introduction and fixing of these through personal growth and assistance to the management of the change organization.

Kimura **Sensei** worked in **Office and Production-Gemba** for more than 45 years during which he developed the JIT production system as a supplier for Toyota, Honda, etc. in SUMITOMO Corp. from the position of a young engineer to General Manager passing through internal & external consulting.

At the time of publication and over the age of 75, he continues working on the dissemination of original Japanese methods and more knowledge; even the one learned from the pioneers. He continues working as an international consultant for the last 25 years in more than 11 countries, training clients, as a lecturer and writer. Even now, experimenting, researching innovative methods, and growing in the field of Production Management and Corporate structuration.



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Autor/Author:  
 Sensei Koichi Kimura – JAPÓN/JAPAN © 2023  
<https://jp.linkedin.com/in/kouichi-kimura-2ba37152/en>



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## Icons:



Notes: Going and Comeback to the main theme.



The third level of the Issue provides more clearness to the structure of the text to the more relevant.



Lower levels of the Issue, commonly 6<sup>th</sup> or 7<sup>th</sup>, and, pointing out necessary explanations about pictures or graphs.

## UPDATING TABLE:

Date, Version-Previous & V-Next	Chapter (I..XX...)	Chapter Point.- sub-point : (Updating)

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# I. Prologue

Please understand, I'm writing TQM (Total Quality Management). And, probably your image of TQM writing is such TQM tools. However, even though I will write about these tools also, here, I need to write the biggest concern about the actual TQM implementation. Even though if you want a usual TQM book, please buy it in the market.

Now, my biggest concern as a company is the deterioration of the young generation's thinking capacity which can be paraphrased as the deterioration of creative thinking.

The progress of AI (Artificial Intelligence) makes a more and more convenient world. We don't need to cram in knowledge, AI can teach it JIT and OJT. For instance, I questioned Chat-AI with the next phrase.

*Creative thinking is a brain function, but how to increase it?*

...And the answer to *Bing Chat-bot* is as next:

*There are many ways to increase creativity. Here are some tips that might help you:*

1. **Take breaks** - Taking breaks can help you relax and clear your mind. This can help you come up with new ideas.
2. **Exercise** - Exercise can help you increase blood flow to your brain, which can help you think more creatively.
3. **Try new things** - Trying new things can help you see things from a different perspective and come up with new ideas.
4. **Collaborate** - Collaborating with others can help you get new ideas and see things from different perspectives.
5. **Keep an open mind** - Keeping an open mind can help you see things in a new way and **come up with new ideas**.
6. **Practice** - Practicing creativity can help you develop your skills and come up with new ideas more easily.
7. **Get inspired** - Getting inspired by other people's work or by nature can help you come up with new ideas.

*I hope these tips help! Let me know if there's anything else I can do for you.*

Even now I think you can feel "What a hateful fellow!"

As you see, what is so-called knowledge is easily available. However, you will have a strong barrier. It is creative thinking. And, creative thinking begins with "What? ...That is a sincere interest"

The young generation such so-called Z generation (*Chat-bot* generation) is losing creative thinking against their job.

They become less greedy to widen their knowledge (for their job). One of the causes is it is too easy to search for necessary knowledge. A Chat-bot gives the answer which they wish to know very easily including fake. On the other hand, the conventional search engine shows many

materials which involve keywords. Therefore, it is necessary to read some papers. This act can avoid the risk of being fake and also sometimes induces other thoughts thanks to a term I introduced in the last lecture TQM-3: *Serendipity*.

Chat-bot, Meta, Remote work or meeting in Zoom, etc. The world is becoming more and more convenient.

But please know the disadvantage behind the convenient. So, the improvement of convenience is not all good, but human is becoming to lose some capacity. I would suggest one thing. It is to devise any "inconvenient". This means, executing "inconvenience" in your daily life intentionally.



## II. TQM – Thinking Environment

Long years, I do a consulting business in foreign countries. But I'm in a situation of unemployment for several years, because of COVID. Of course, I'm continuing the job on the Internet. Unfortunately, the situation of my job is almost volunteer, and no income. (In my heart. Well, there is no way, is there.)

Now, the story of the **Thinking Environment**.

When starting the consulting job, I diagnose the client company by the checklists, which are very convenient to see the company as multifaceted. Factory Management Checklist. This has 11 themes which are Policy Control, Organization and administration, Human resource development, Information gathering & transmission & usage, Standardization, Cost control system, Material control, Quality control system and Safety control, Work environment, and Environmental Conservation.

Next is an example of the company I describe in the lectures named "Teaching Company":

Theme	Check Items	Points	%
1. Policy Control	8	19	47.5
2. Organization and administration	9	22	48.9
3. Human resources development	10	25	50
4. Information gather & transmittion, usage	8	23	57.5
5. Standardization	10	28	56
6. Cost control system	13	30	46.2
7. Factory Management system	11	32	58.2
8. Production control	10	27	54
9. Material control	12	29	48.3
10. Quality control system	13	28	43.1
11. 11. Safety control, Work environment, Environmental Conservation	6	15	50
	110	278/550	50.5

And, I will add the 12<sup>th</sup> theme, which is the **Thinking environment**. I think we are facing big changes in the labor market.

Thus, what means a big change in the labor market!? ...Of course, one is AI (Artificial Intelligence). And another is Gen Z and Gen AIN (Generation AI Normal) phenomenon.

And now, What do Gen-Z and Gen-AIN phenomena would means!? ...I already explained Gen Z in TQM-3<sup>1</sup>. And we need to pay attention to the handle of this generation.



**TQM-3 TQM-**  
Hardware, TQM- Software &  
TQM-Diagnose [eng]

<sup>1</sup> **TQM-3** [eng]: <https://archive.org/details/tqm-3-hardware-software-diagnose-cost-reduction-6>  
[esp]: <https://archive.org/details/tqm-3-hardware-software-diagnose-cost-reduction-6>

In reality, employees' thinking capacity is declining visibly. Employees are becoming no thinking by themselves gradually. And this phenomenon which is the deterioration of thinking capacity will increase gradually. They've literally been becoming the one who waits with no creative thinking.

Therefore, the company needs to prepare the **Thinking environment**. For instance, the companies represented by the five Big-Tech<sup>2</sup> provide a good environment for creative thinking (free space, lounge, etc.).

But such a GAFAM style is not sufficient at this time and from now. Because these are based on the condition of which the employees have some level of creative thinking capacity. Of course, some level of creative thinking capacity is essential for any industry. However, the thing is more serious, because even minimum thinking capacity is becoming lost by SNS and mobile phones (smartphones).

Therefore, you need to provide a **Thinking environment** for education & OJT<sup>3</sup> training in-house.

On the other hand, in the coming decade to the next two decades, the manufacturing system will be changing with AI, IoT, and RPA<sup>4</sup> (Robotic Process Automation). And in such an era, the employees are required for creative thinking capacity. Then a company will intend to hire such human resources. However, it will be not enough just waiting for such human resources. And it is necessary to prepare the thinking environment.

Consequently, The Factory Management Checklist had 11 themes. And now, I add the 12<sup>th</sup> about the creation of a **Thinking Environment** in the company.

## 1. A very dirty *Production-Gemba*, even cleaned up.

By the way, I was thinking what are the facts, or the root causes, for the deterioration of the quality improvement plan, or defect countermeasures.

One of the causes is the deterioration of Creative thinking. This phenomenon is accelerating because of the company's misunderstanding or ignorance. I introduce a concrete example of a company, even if it is an old example.

That company was profitable two years before my visit, but it was becoming unprofitable and fell in red when I was invited. From now, I speak about the story of the **Thinking Environment** and **Kaizen**.

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<sup>2</sup> FAAMM [eng] **Big Tech**. (2023, April 20). In Wikipedia. [https://en.wikipedia.org/wiki/Big\\_Tech](https://en.wikipedia.org/wiki/Big_Tech)  
**GAFAM**: Google, Amazon, Facebook, Apple, Microsoft: Gigantes tecnológicos. (2023, January 18). en Wikipedia. [https://es.wikipedia.org/wiki/Gigantes\\_tecnol%C3%B3gicos](https://es.wikipedia.org/wiki/Gigantes_tecnol%C3%B3gicos)

<sup>3</sup> **OJT**: On the Job Training: On-the-job training. (2023, April 4). In Wikipedia. [https://en.wikipedia.org/wiki/On-the-job\\_training](https://en.wikipedia.org/wiki/On-the-job_training)

<sup>4</sup> **RPA**: Robotic process automation. (2023, March 17). In Wikipedia. [https://en.wikipedia.org/wiki/Robotic\\_process\\_automation](https://en.wikipedia.org/wiki/Robotic_process_automation)  
 Automatización robótica de procesos. (2023, March 29). In Wikipedia. [https://es.wikipedia.org/wiki/Automatizaci%C3%B3n\\_rob%C3%B3tica\\_de\\_procesos](https://es.wikipedia.org/wiki/Automatizaci%C3%B3n_rob%C3%B3tica_de_procesos)

I was invited by a medium size manufacturing company. The concern of this company's representative who invited me was the sluggish business results. He was a director in charge of Accounting. He mailed me on the Internet and expressed his wish. And after several communications, we decided on the date and time of my visit. Then, we had a meeting after the plant tour.

The attendees of this meeting were the Accounting Manager, the Sales Manager, the HR Manager, and the Production Manager. The president wasn't in this plant normally and it was managed by 4 directors' parties. And, they asked me about the comment on the plant tour and sluggish business results in the meeting.

—First I appreciate your invitation and kind plant tour —I express my gratitude and welcome —. So, you are asking my advice regarding the sluggish business result — but something in my heart was telling me it was impossible with only a short plant tour, in the meantime, I was laughing gently and jokingly.

—I don't know, because I don't do divination and am not even a wizard. I give you my factory checklist and suggest you diagnose your factory by yourself. Also, if you like or found acceptable, please disclose your 3 years annual action improvement plan for instance Quality Improvement Action plan. I may be able to suggest your question. Even so, your factory is dirty, isn't it? — I asked finally.

—Dirty!? —Asked surprisingly the Production Manager—. Is our factory dirty?! ...We are paying attention to keeping the 5S situation. As you looked around, our shop floor has not one piece of dust fallen. I'm not bragging, but the machine is also polished to a shiny finish.

—5Ss!? —I questioned— Mr. Production Manager, do you know about 5S? It is very good —I spoke to him flattery.

—Yes —The Production Manager asserted surely—. I and my shop-floor team are studying JIT (Just in Time. The thought of Toyota Production System). And the effect is appearing gradually. Do you know TPS? —he asked finally.

—Ha, ha, ha. Just a little —I expressed.

—Everyone —the Production Manager pointed out—. Currently, my team is studying JIT. And as you can see, the effect is gradually appearing on the shop floor. But Mr. Kimura evaluated our factory to be dirty. Why such an evaluation was made? ...It is wrong and my 5S condition is excellent —said he and he continued explaining what TPS is, according to him. —TPS is...

—Mr. Production Manager —Questioned the Accounting Manager—. Please stop. And, shall we listen to the comment of Mr. Kimura?

With laughing. And yet, he had a threatening air, had he I talked just a little bit more seriously —Mr. Accounting Manager. You told me that your worry is the slugging of the company's profitability in recent years. Has your company had a period of profitability? ...If you say "yes", it is my surprise, because your company has all the visibility phenomena of a bad factory which are: 3 phenomena of an unprofitable factory; Dirty, Non-understandable by visual, and a lot of stuff —and I detailed deeply.

—Firstly, dirty. Dirty conditions cannot induce creative thinking. Secondly... —when the Production Manager interrupted me suddenly.

—Wait a minute Mr. Kimura. Again, you tell us my factory is dirty?! Ridiculous. The business reason for sluggishness is quite clear that is the unachieved sales expansion.

—Ok, Ok —I tried to calm him down—. Please let me finish my speech, or do you wish to stop?

—I also agree with Production Manager and think our factory is kept good Seiri and Seiton —The HR Manager expressed convincingly.

—Ms. HR Manager, indeed, your factory looks shiny, and no dust on the shop floor and machines. However, there are too many goods. Indeed, these goods are piled up in the designated areas. But, can you understand which necessary goods are for today's production? —And I detailed—. Goods? ...Are these work-in-progress, aren't? ...Do you need these so much for today's production?

—I don't know the total inventory situation. But, I can guess that you have excess inventory.

—Ms. HR Manager —I told her—. My biggest worry is the factory and office conditions. Dirty. It is really dirty and odor. It is a toilet. Moreover, it is an untidy backyard. A production Gemba is the company's face. And when making a plant tour and evaluating it, I look at not only the production floor (main street like Champs-Élysées) but also places where 5Ss are often forgotten such as garbage cans or scrap boxes, toilet and backyard (an alley). Conversely, if these 3 points were dirty, the factory is actually a company without sloppiness, even though the main street is very tidy.

My impression of Champs-Élysées is well maintained and not so dirty, but one entering an alley, it is indeed dirty with cigarette butts, waste paper, plastic waste, plastic bottles, etc.

—For instance a Garbage can —I detailed—: You are separating material scrap (metal) and other garbage by colored cans. It is a good thing. But why chewing gum and candy stick are in the scrap cans? Basically, is it allowed to eat on the shop floor? No, not allowed.

—Backyard —I continued—. There is no comment that I can. But just one word. That area is the death graveyard, is there. With all kinds of wreckage; equipment, material, finished goods, pallets, boxes, etc.

—Toilet. The most familiar place where **Gemba** employees can back to the individual is the toilet and satisfy physiological needs —And when making such a comment, most of the reaction is that Kimura is making his special joke. But it is never a joke, but serious. So, in my experience, the company that underestimates 5Ss of toilet is not successful in companies past days and at present. And the companies' future is on the extension line of the past days and present.

—In where do you get yourself, openness, and brain blank back? ...Coffee or tea break? ...It is good, but toilet break also too. —And I continued...

—Rest area (including cafeteria or canteen). A long day ago, I saw one movie. It is "Modern Time" by Charles Chaplin. The main character succumbed to the delusion of tightening up bolts in the production line work. It's hard to imagine in modern times. There will definitely be a break time, and a rest area will be prepared from the point of view of welfare. However, when looking at the tendency of medium or smaller manufacturing companies, they have too poor resting places. And some companies even haven't this. And they are saying the importance and encouragement of Kaizen mind by employees loudly.

—Importance and encouragement? —I tried to finish my speech—. They are doing the exact opposite of these words. So, now I believe you could understand...

—What is the necessary environment in the shop floor for not only the recovery of motivation, and physical rest, but also the brain rest and brain switching...

—Your company —I when to the point they were interested—. When visiting the factory, I couldn't find a rest area on the shop floor but could look at the canteen. There is no rest area on the shop floor (production Gemba), but too many stocks on the production line side...

—And, backing to the toilet. A rest area is important. But the rest area and toilet are different in the purpose required in the psychological impact —I pointed out—. So, if making such lectures in companies, most people make a suspicious faces. And. What? And, In the Toilet!?

—By the way —I change quickly the matter—. Your company also is encouraging *Kaizen* and suggestions. But it is not going well. I can know without seeing the data. Your toilet is too dirty —I went back to the same point.

—Listen everyone —I called their attention—. Please consider the mechanism of creating ideas. In what condition, circumstances, or environment, do you hit upon an idea? The time of situation of considering something deeply? ...No, never...

—The condition, situation, or environment are as next —and I detailed:

- 1) Dialogue in diversity and reading books: Be induced by another idea.
- 2) Idle walking, chattering, and sunbathing: Brain relaxed.
- 3) Time absent-minded, simple repetitive work, power nap, and release physiological needs. (Including Excretion): Brain blank and open.
- 4) Short exercise: Brain refreshment and blood circulation

—Please think about when you have an inspiration and fresh idea. I believe the most of occasion is in the above 4 items, but not in the timing of thinking something deep consideration for one thing.

—Why? ...Why it is not in the timing of deep consideration about one thing? —I asked myself and I answered in the same way—. The cause is to have a bias in the brain which can be called persistence to the thing.

—There is a word SERENDIPITY<sup>5</sup> that means a sudden stroke of good fortune, but perhaps it is possible to say that the development of science and technology has been achieved through the serendipity of many talented people.

—What is the effect of a beautiful toilet? As you understand, they are three effects: For Brain blank and openness, Meditation by Zazen is effective. So, Meditation by Zazen!? —I asked myself—...It is too difficult for us, is it? —and I tried to explain it deeply but it was the right

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<sup>5</sup> **Serendipity** [eng]: <https://en.wikipedia.org/wiki/Serendipity>  
[esp]: <https://es.wikipedia.org/wiki/Serendipia>

opportunity to explain such a thing—. No, not difficult, but easy. Anyway, I recommend you implement it in the Toilet.



### **Meditation by Zazen<sup>6</sup>**

*I wrote this somewhere<sup>7</sup>, as far as I remember, but now briefly. The steps are as next:*



TPM-8 Prevention of  
scattering & Meditation

- After done the thing, you can get the condition of "Brain blank and openness".
- Straighten your back and keep your eyes half-open, gazing at one point.
- Arrange your breath (shallow abdominal breathing)  
(Mantra; **Chou-shin, Chou-Soku, Chou-Shin**)  
**Chou:** Arrange. **Shin:** Body.  
**Soku:** Breath. **Shin:** Mind.



Zazen in Wikipedia [eng]



*It takes 3 minutes in total. Then, I call this short exercise **3 Minutes Mindfulness**. And anybody can do it easily. However, they may not do it, may they? ...But it is possible to say that anybody can get the condition.*

*After doing the thing, you can get the condition of "Brain blank and openness". Therefore, I suggest you prepare beautiful circumstances of the toilet if you surely wish **Kaizen** mind.*

## **2. Muda and Waste**

—I saw the logo of "Reduction of Waste by Kaizen" in the **Production Gemba** and the **Office Gemba**. —I continued explaining them—. Please understand the next 2 things. The first one is the creativity of each employee determines the future of the company. And the second one is we are asked whether we can bring together the wisdom and sense of responsibility of "individuals" and turn them into strength.

—I suppose that haven't you the problem of high turnover? —And I call the attention of everyone— everyone. Do you understand the word **Muda**? ...**Muda** is Japanese, and the meaning is "Waste" in English.

—Anyway, I understood the human resources **Muda** by just this short plant tour —Indeed it was a lie because actually, I disclosed the annual turnover ratio which was more than 20%. Then, I could recognize the human resources **Muda**.

...

<sup>6</sup> **Meditation by Zazen** [eng]: <https://en.wikipedia.org/wiki/Zazen>

[esp]: <https://es.wikipedia.org/wiki/Zazen>

<sup>7</sup> **TPM-8 – Prevention of scattering & Meditation by Zazen** [eng]:

<https://archive.org/details/tpm8preventionofscatering>

[esp]: <https://archive.org/details/tpm8prevenciondeladisersion>

In the middle of this dialogue, the quality data, and annual action plans with results were disclosed. And we took 30 minutes coffee break. During this, I examined the materials quickly.



## My impression of the data of this company

Ah, just as I suspected. They have the Bias pitfall. After the coffee break, the Quality Manager also attended the meeting.

—Everyone —I called them—. I'm an expert in TQM (Total Quality Management) and it is one of my consulting businesses —Thinking in parallel it was my bluffing and propaganda—. It is quite clear that your engineers and the **Gemba** people have a Bias pitfall. And, it is possible to say that one of the big enemies of quality improvement is Bias which is induced by a poor thinking environment.

—But, Why? ...Why can I say so? —I asked to myself—. I tell you 3 things which can be recognized in the QC materials:

- In these 3 years, the quality improvement results (Defect ratio, Number of Customers' quality claims) are in sluggish;
- Similar quality countermeasures are taken up repeatedly, and;
- Nobody taking responsibility for the results.

—I suppose the quality engineers and Gemba employees are making an effort. However —I pointed out—, they cannot gain good results. Why cannot they break through?

—To break through this situation, you need to take action from 2 sides which I call Hardware and Software sides. Hardware is Organization (Including Policy Control) and System (such as QC story and equipment). And Software is so-called the Thinking environment.

—I know that it is impossible to diagnose all situations particularly the causes of the business sluggish by short plant tours. However, you disclosed to me the QC data going back 3 years. Perhaps, I think the root causes of both Quality Issue and Business sluggish are the same in most of the parts.

Even in my heart, I feel such a comment was sly, just because any companies have some quality problem or concerns. Also, if given the above three points, one of them will get caught.

I don't know that you may not have a problem with the Hardware side. But it is quite clear that you have the defect of thinking environment.

—Dirty! And indeed, the odor of your toilet is! ...And I cannot imagine not having a rest area in a factory. Probably, your company is the company that cutting corners in invisible areas or parts —but I pointed it out—. Unfortunately, your engineers' creative thinking capacity is poor.

Honestly, I thought people with really melancholy faces, they are! Why not try laughter yoga?



Why do the minds of these top managers have bias and lost flexibility? In a short meeting with them, I felt they looked like falling into something of a spell. The situation of lost creativity seems to be not just for engineers, but also for these top managers. It might be the pressure from headquarter.)

—Everyone —I called their attention—. Why same quality problems are reoccurring? ...And why these are similar countermeasures? ... I tell you 2 things. One is the importance of the thinking environment. Another is Bias, which must be broken through by creative thinking in a proper thinking environment.

### Thinking environment

—I said that your engineers have poor creative thinking capacity. But it is probably not correct —I pointed out—. The true cause is the very poor thinking environment by your company.

—Please remember that any improvement requires creativity. You have the system of Suggestion Scheme, have you? I saw suggestion boxes in production Gemba. But the result seems to be not good. And the root cause is the same. It is not possible to expect a suggestion and creative idea by shop floor people in the condition which is the space of just working and is an inorganic environment.

### Inorganic space.

—This is my first impression when I entered your factory site. What an inorganic site, it is!

—A manufacturing factory is felt basically inorganic —I expressed my feeling—. But the company intentionally plants flowers, trees, or other greens and puts photos, pictures, and others to seek sensuous peace (in the brain). But, there is no rest area in your factory. Moreover, there is a canteen which is very stark and dreary.

—Your inorganic space which is only for working space doesn't give the important environment (thinking environment). But, there is no rest area in the **Production Gemba**. And there is no bench outside of the factory too. Then they need to go to the dreary cafeteria or sit down beside the production line for taking a rest.

—When the time of a human comes up with an idea, does it? ...It is the time of breathing time. So, when can you or your employees take the breathing time, and at where?

—Your toilet is too dirty and odor —I disappointedly told them—. The best time for people to take a breather is the time to release what they've been holding back in a toilet. Ha, ha, ha —and I laughed—. But it is quite true. However, —I repeated— However, your toilet is too dirty.

—This is my suggestion. Please put in order the thinking environment, if you desire a suggestion scheme and Kaizen —I finished.

—I understand the importance of the suggestion scheme and Kaizen —the Production Manager Expressed—. But if we are putting in order the rest area, it is necessary to



change the plant layout to create the space. And we cannot spend such a waste of money. Basically, there is no such space.

—Ha, ha, ha. —I laughed again—. It's not my matter. If you like to continue your current condition, you do to be so. Please listen, Kaizen, or in other words, creative thinking is not cost-free but requires proper investment.

—Not possible to find space for a rest area? —I asked myself and without waiting for any sudden answer I answered to myself — It is possible to avouch, you have abundant space.

—You are telling that keeping a good and beautiful shop floor (Gemba) by 5S. I give you my 5S checklist for my thanks for this invitation. Please try to check with this —I asked them.

—Mr. Production Manager —I told him—. Your Gemba is never in good 5S condition. As you know (I thought) 5Ss is constructed of **Seiri, Seiton, Seiso, Seiketsu, and Shitsuke**, is it? ...And the first **S** is **Seiri**. The action of **Seiri** is to identify necessary goods and unnecessary goods and unnecessary goods to be moved to a proper area such warehouse. And most important meaning or action of **Seiri** is to make clear the necessary and unnecessary goods by visual and the standard...

—I saw several crashed and discolored boxes beside a production line. These look old. Why I'm telling such a severe comment, such phenomena are one kind of thinking about environmental deterioration...

—Mr. Production Manager, fortunately, you are seeking a good 5S environment. Then, please pursue the true 5Ss —I asked him—. And you could find sufficient and abundant space for Gemba's rest area if pursuing true 5Ss. Is it indeed "Two birds with one stone", isn't it?

I think you already understand what this company is. Yes, it was my first encounter with the Teaching Company. I know my comment is always strict. But this is also my job style.

—Well, everyone —I called their attention—. In our conversation until now, there were interesting 2 words which are **Muda** and Waste. And, when I teach a company, I use these words properly.

—Thus, when identifying **Muda** in a dictionary, it says "Waste". But Japanese **Muda** which I teach and English Waste have different nuances or meanings.

—First, Waste: A dictionary tells this as next: "an unnecessary or wrong use of money, substances, time, energy, abilities, etc.".

—And now **Muda**: **Muda** has also the same meaning as the above Waste. But in my teaching, I tell you that there is "*Useful **Muda** or Necessary **Muda***". So, *Useful* and *Necessary **Muda***?

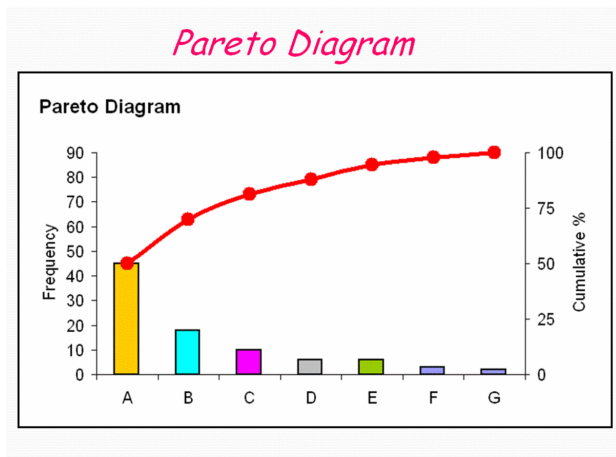
—Wait a minute, Mr. Kimura—interrupted suddenly the Production Manager—. What are you saying, are you saying a joke? —he continued—. **Muda** is waste. **Muda** is defined in a book as "No giving any value to a thing". Do you deny this book which I remember is TPS (Toyota Production System). Don't you know TPS, do you?

—Mr. Production Manager —I tried to be soft in my words—. I think you are learning TPS well, you are. However, I dare say that there is a *Necessary Muda*.

—Everyone —I tried to recover my speech—. It is case by case. Above dictionary is correct. And I never deny it. However, for brain or Creative Thinking, *Muda* is not waste, but necessary.



—For instance *Muda* Time  
— Idetailed—. *Muda* is a vitamin of Brain and Creative Thinking. For instance, have you ever heard of the "Pareto<sup>8</sup> Principle"? ...Also known as the "80/20 rule". You know Pareto, do you? —and without waiting for any answer I continued—. Yes, we are using Pareto Diagram in Quality Control...



—He was an economist. And not only the Pareto diagram but also this Pareto Principle is famous in the world. Thus, this principle says next: *80% of your success comes from 20% of your work...*

*Pareto principle in Wikipedia [eng]*

—Believe it or not, 80% of the work you do only 20% of the time. Therefore, if you think that eliminating wasteful things will increase productivity, it will not. Pareto's Principle is a universal principle, and even if you cut something that seems wasteful, new waste will be created again, and in the end, it will settle down to 2 to 8...

—After all, 80% of the work that produces only 20% of the results still exists with "functions". I told you that Useful *Muda* or Waste are cases by case. You need to understand 80% of your activities in your life are constructed of *Muda*. Thus, if just thinking production efficiency in front of the production line, *Muda* is Waste...

For instance, sleeping.—I detailed—. In the case of leaving such a production line for instance Sleeping, it is never *Muda* and important for the Rest of the brain and also the 2S (*Seiri* and *Seiton* in 5Ss) of memory.

The above dictionary is correct. And I never deny it. However. For brain or Creative Thinking, *Muda* is not a waste, but necessary.



*Pareto principle*

<sup>8</sup> Pareto principle [eng]: [https://en.wikipedia.org/wiki/Pareto\\_principle](https://en.wikipedia.org/wiki/Pareto_principle)  
[esp]: [https://es.wikipedia.org/wiki/Principio\\_de\\_Pareto](https://es.wikipedia.org/wiki/Principio_de_Pareto)

*The Pareto Principle is a power law discovered by Italian economist Vilfredo Pareto<sup>9</sup>. In the economy, most of the overall figures are produced by some of the elements that make up the whole. Also known as the 80:20 rule or the law of variability.*

**Wikipedia**

*You may not hear Pareto Principle but know the Pareto diagram of QC 7 tools. This Pareto diagram was also devised.*

—I told you that Useful **Muda** or Waste are case by case. And you need to understand 80% of your activities in your life is constructed of **Muda**. If just thinking production efficiency in front of the production line, **Muda** is the same as Waste.



#### **REM and NREM Sleep<sup>10</sup>.**

- **REM Sleep:** Rapid Eye Movement Sleep.
- **NREM Sleep:** Non-Rapid Eye Movement Sleep.

*One of the roles of sleep is to organize memories, and the proportion of REM sleep is said to be about 25% of the total sleep.*

*REM sleep is thought to play an important role in organizing thoughts, organizing and consolidating memories.*

*During non-REM sleep, the function of the brain declines, and the body temperature is lowered to promote cooling of the brain, so the brain rests.*

*In contrast to REM sleep, non-REM sleep can be said to be sleep that allows the brain to rest.*

*By the way, recent progress in brain science is indeed remarkable. And according to a book, the appearance of MRI (Magnetic Resonance Imaging) accelerated (and accelerated) the progress.*



*REM & NREM Sleep  
Wikipedia [eng]*

<sup>9</sup> **Vilfredo Pareto** [eng]: [https://en.wikipedia.org/wiki/Vilfredo\\_Pareto](https://en.wikipedia.org/wiki/Vilfredo_Pareto)  
[esp]: [https://es.wikipedia.org/wiki/Vilfredo\\_Pareto](https://es.wikipedia.org/wiki/Vilfredo_Pareto)

<sup>10</sup> **REM & NREM Sleep** [eng]: [https://en.wikipedia.org/wiki/Rapid\\_eye\\_movement\\_sleep](https://en.wikipedia.org/wiki/Rapid_eye_movement_sleep)  
[esp]: [https://es.wikipedia.org/wiki/Sue%C3%B1o\\_de\\_movimientos\\_oculares\\_r%C3%A1pidos](https://es.wikipedia.org/wiki/Sue%C3%B1o_de_movimientos_oculares_r%C3%A1pidos)

*And a thing found out is that the brain is working very hard in relaxing time. It was my surprise. I believed that the brain is resting and has no work in relaxing time. However, it (my image) was wrong.*

*It's not just me...*

*"In the past, it was thought that the brain was resting when it was absent and not thinking about anything. However, it turns out that it is actually more active. It is not the entire brain but is actually multiple brain regions that connect in a rhythmic, heightened activity network called the Default Mode Network (DMN; found by Professor Marcus E. Raichle).*

*Marcus E. Raichle (born March 15, 1937) is an American neurologist at the Washington University School of Medicine in Saint Louis, Missouri. He is a professor in the Department of Radiology with joint appointments in Neurology, Neurobiology, and Biomedical Engineering. His research over the past 40 years has focused on the nature of functional brain imaging signals arising from PET and fMRI and the application of these techniques to the study of the human brain in health and disease. He received the Kavli Prize in Neuroscience "for the discovery of specialized brain networks for memory and cognition", together with Brenda Milner and John O'Keefe in 2014.*

**Wikipedia**

*The brain divides roles according to brain regions, so when you use your brain to focus on something, the activity of each brain region that specializes in information processing increases. The strange thing is that Default Mode Network (DMN) activity declines no matter what we focus on when processing information. In recent years, the DMN has attracted worldwide attention in brain science."*



*There is one more thing I was surprised about: According to Professor Marcus E. Raichle<sup>11</sup>, only about 5% of the energy consumed by the brain is used for "conscious activities" such as reading and working. And about 20% of the energy is used for the maintenance of brain cells, and the remaining 75% is used for "activities when you are idle without doing anything".*

*15 times more energy is used when you're sitting idle than when you're doing a conscious activity. It was indeed my surprise.*

*The Restless Brain - Dr.  
Marcus Raichle - Youtube*

*This is my guess, but the work of DMN is like the "defrag: defragmentation" of Windows in a computer. Thus, originally, a lump of data is stored in a*

<sup>11</sup> Professor Marcus E. Raichle [eng]: [https://en.wikipedia.org/wiki/Marcus\\_Raichle](https://en.wikipedia.org/wiki/Marcus_Raichle)  
The Restless Brain - Dr. Marcus Raichle - Kavli Prize Laureate Lecture (Youtube):  
<https://www.youtube.com/watch?v=p8LJ95IChs>

*disjointed state, but it is reorganized as much as possible. And, it is like a function of Windows that organizes the contents of the hard disk.*

*The function of the DMN, which increases activity when relaxing and absent mind, is not yet well understood. But it is said that Serendipity often has an epiphany when they are relaxing and having an absent mind, and this seems to be related.*

*In the very future, simple intellectual work will be replaced by AI (artificial intelligence), so it is said that it will become increasingly necessary to acquire creativity and inspiration.*



*However, it seems that the condition of the DMN is not always good. Being in an absent mind all day can lead to premature dementia. It seems that it is important not to increase the activity of the DMN, but to make it moderately active.*

*According to the brain science book, for business people, the recommended amount of time to be in absent mind is: I don't know the time that will be the standard, but first, try to get absent mind time for a few minutes. When there is a waiting time such as moving to a train, waiting at a traffic light, or using the toilet, you tend to touch your smartphone immediately, but the outside world If you only reflexively respond to the stimulation of the DMN, there will be fewer opportunities for the DMN to become active.*

*Consequently, If you are aware that your brain is running at full speed on a daily basis, you need to be conscious of the absent mind time.*

Now I believe that you could understand why I'm writing such a thing. Your wish is to encourage **Kaizen** and improvement of quality level. The base of them is the same. And my suggestion is to prepare the proper Thinking environment. I never say difficult things. As a company, it is essential to provide proper welfare in Gemba. And my suggestion is to add the consideration of the **Thinking environment** to the welfare.

### 3. Thinking environment

Once again, a **thinking environment** is built as next:

- 1) Dialogue in diversity and reading books; Be induced by another idea
- 2) Idle walking, chattering, sunbathing; Brain relaxed
- 3) Time absent-minded, simple repetitive work, a power nap, and release.  
Physiological needs (including Excretion): Brain blank and openness.
- 4) Short exercise; Brain refreshment and blood circulation

Do you need much investment to prepare for such an environment?

Let's go back to the meeting with this company.

—Everyone—I called their attention—, I suggest you change the concept of a factory. A factory is the **Production-Gemba** where producing products, but please consider it as well as the place of thinking about future development.

—I suggest you provide better spaces (Cafeteria, Rest area in Gemba, Toilet, Backyard for rest, Green plants & benches, etc.) which are effective not only to improve the **Kaizen** mind, and also to the Human resources waste.

There is a now Motivation Checklist (Now, Employees' Engagement Checklist<sup>12</sup>). I suggest you check the employee's engagement with this. I can imagine there are many problems with human resources Waste. If not, we cannot imagine the reason for the very high turnover, even if it may be a too poor salary.



*TPM-10 Employee  
engagement + Oil Control*

—Ok, I understand —The Production Manager looked comprehensive—. Everyone. I promise you to provide the **Gemba** rest area till the end of next month. Ms. HR-Manager, Please advise me about it from the point of view of welfare.

—Good —the HR-Manager agreed—. And I also prepare the better environment of canteen space. But are these measures affect business performance improvement? —she asked, and immediately she continued without breaking—. The beautification of the toilet is my responsibility and I will take proper action for it.

—But how do you find or create the space for the production shop-floor rest area? —asked the HR Manager finally.

—Mr. Kimura's suggestion may have no effect on our target —the Production Manager asserted—. No, completely no effect. However, providing better shop-floor conditions is a company's duty. Finding space is now easy.

Then the Production Manager pointed out: —Everyone. As you know, I'm planning the use of outsourcing and transferring one production line to an outsourcing company. And this is the first trial of outsourcing use. And if it is successful which the meaning of profitable is, I will expand this policy to all products.

From here, a little divert from the main topic of Thinking Environment. Therefore, please skip reading, if you don't like it.

Mr. Kimura —told me the Accounting Manager—. We are expecting this trial. But it is actually not a trial but is one of the headquarters' policies. Its intention is future business expansion. The headquarters' will is to preserve the in-house production capacity and expand sales. However, now the plan is having a deadlock instead of improving sales, declining actual sales and now we cannot even current profitability.

<sup>12</sup> **Employee engagement checklist in TPM-10 [eng]:**

<https://archive.org/details/tpm10employeeengagementoilcontrol/mode/1up>

[esp]: <https://archive.org/details/tpm10elcompromisodeltrabajadoryelcontroldelalubricacion>



—That's right —the Production Manager agreed—. The speech of our Accounting Manager shows everything about our difficulties. And the evil root cause is the sales expansion plan and results. I would listen to the excuse of our Sales Manager.

A great silence appears in the meantime everybody looked at the Sales Manager.

—Mr. Sales Manager. How about your excuse? — asked the production manager.

—Please understand that our team was and is struggling to keep the plan and expand the sales amount. We are struggling. —the Sales Manager apologized and excused—. However, the market situation has changed and is changing rapidly. If I say so, it may sound only like complaining, but it is quite true. Moreover, there are other causes regarding the decline in the competitiveness of our products. There are quality issues and late delivery:

- Quality claim (by customer) ratio is increasing. The age of the Number of Quality Claims to be one in one or two months is now a dream. Now there are constantly 2 to 3 per month.
- The late delivery rate also is getting worse and now more than 3%. Last week there was a problem. It was a late delivery of a product. Then we took quick action and shipped the product. However, the product shipped was found defective.



### Late delivery rate

In TPM-3<sup>13</sup>, I explained KPIs (Key Performance Index) and DTO: Delivery Time Observance Ratio:

$$\text{DTO Rate} = \frac{\text{Actual Output}}{\text{Planned Output}} \times 100$$

The Sales director explained the delivery rate as above calculation. The figure of 3% is of course a bad number.

—Listen everyone —the Sales Manager pointed out—. Our group (sales department) is facing 3 difficulties. One is a quality issue. One is late delivery. And another is cost competitiveness.

I rather prefer to omit such a barren quarrel...



*TPM-3 Preventive  
Maintenance KPIs [eng]*

<sup>13</sup> **TPM-3** [eng]: <https://archive.org/details/TPM3PreventiveMaintenance>  
[esp]: <https://archive.org/details/TPM3MantenimientoPreventivo>

—Listen, Mr. Kimura —the Production Manager said to me—. Initially, this factory was established by me and my project team. There were many difficulties and troubles in establishing the current production system. And at last, we could reach the benefit at 2 years since starting this plant. We started this factory from 0. And initially, there were many quality troubles and delivery troubles with customers.

In the meantime, some other directors' speeches started again. I was disgusted.

—However, we could reach the current sales amount and gain profitability. I understand there was good support from other departments such as HR, Accounting, Engineering, and of course the Sales department. But ... — the production manager continued excusing...

I prefer to omit his brag and heroic story. Really I was disappointed. And the next is just in my feeling in the meantime I was listening in silence. I actually didn't care.

...But it is understandable the causes of declining sales and losing profit. And it is not necessary to make questions about the solution to the current situation to me. Because they know or can know the causes. The biggest problem is just one word and is their teamwork. They have a gorgeous office separately. The director who has far his office on his shop floor is the Production Manager. And they are working separately. In the case of HONDA, directors are on one floor so called **Oh-Beya**: Big Room, and do not have individual offices. In the case of UK Nissan, the president, directors, and also each department were on one floor, and no individual office when I visited. They intended best to communicate with each other. But this Teaching Company is ridiculous. I suppose that the style of this company is common in European and US companies. But bad teamwork in this company is out of the question. From where comes such bad teamwork? ...It seems to be from the Production Manager.

Mr. Production Manager may be a "narcissist" because he has particular characteristics of a narcissist. But, what actually means Characteristics of narcissism? ...These are 3 particular characteristics: Arrogance, Envy, and a Sense of Entitlement.

People with these characteristics have four special behaviors:

- The act of reconfirming one's own existence by looking for faults in others.
- Attempts to trivialize the existence and achievements of others.
- He believes irrationally that only he deserves special treatment.
- For that reason, he gets hurt and angry just by not being treated like that.

—Mr. Kimura. I'm planning the second dynamic reform of our plant —the production manager suddenly surprised me with another plan— You suggested better welfare and improvement of rest space on the shop floor and canteen. And I will promise and prepare sufficient space beside the production shop floor...

—I'm discussing with headquarters about the second and third outsourcing production transfers. Of course, this plan will be depending upon the effort of sales expansion. A director of headquarter said the idea of Fabless.

—Everyone —the Production Manager called their attention—, Do you know Fabless? ...Now this is becoming a main tide of manufacturing companies. Based upon this thought, I connected with this outsourcing company and made a diagnosis to identify the technical and production



capacity. Then as you know, we decided to use this subcontract. This subcontract has spare capacity still. Therefore, I would expand the subcontracting policy based upon your agreement...

—But I don't intend the complete Fabless, but would intend to make spare capacity for future business. The purpose of outsourcing is not only the in-house production capacity expansion but also for profit recovery. Mr. Kimura. My plan is... blah blah blah.

I prefer to omit that long and heavy speech but put the points of disagreement from other managers.

—Mr. Production Manager — asked the Accounting Manager—. We need to concentrate on the countermeasures of business performance recovery. We know and we accepted the use of outsourcing some products, but not all. Basically, there is no such idea in our middle-term strategy.



### **Fabless<sup>14</sup> (Fabrication facility less)**

*TSMC stands for Taiwan Semiconductor Manufacturing Company.*

*Fabless is an abbreviation for "Fabrication facility less", which literally means having no manufacturing facility (less). In general, manufacturers have their own factories, but in Fabless, the scope of what they do in-house is limited to product planning and development, and they do not manufacture products in-house.*

*It is said that fabless management was born in Silicon Valley in the United States in the 1980s.*

**Apple (iPhone):** *Needless to say, Apple, a global IT company, is also fabless management.*

*By outsourcing manufacturing through fabless management, the initial investment can be reduced and the depreciation cost of capital investment can be reduced. As a result, the break-even point can be significantly lowered.*

*On the other hand, fabless also has some disadvantages.*

*First of all, it is necessary to pay attention to product quality control and production control. Whether fabless or not, customers perceive products as their own brand. Therefore, no matter how much you outsource manufacturing, if you do not maintain the quality and value of your products, you will lose the trust of your customers.*

*It is necessary to select reliable subcontractors and build a system that can check quality and production control.*

*Another disadvantage is the leakage of confidential information and manufacturing know-how associated with outsourcing. Our products are filled with our own know-how,*

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<sup>14</sup> **Fabless** [eng]: [https://en.wikipedia.org/wiki/Fabless\\_manufacturing](https://en.wikipedia.org/wiki/Fabless_manufacturing)  
[esp]: <https://es.wikipedia.org/wiki/Fabless>

*technology, and developed plans. If such information is leaked or if other companies put similar products on the market ahead of others, business opportunities will be lost and serious losses will be incurred. When selecting a subcontractor, it is necessary to carefully determine whether it is a trustworthy partner and whether there is any risk.*

*Fabless, by definition, does not manufacture its own products. Therefore, there is no point of contact in the manufacturing process. Basically, it is not possible to feed back the know-how and knowledge obtained in the manufacturing process to planning and development. Not only does the knowledge within the company fade, but the manufacturing flow becomes someone else's affairs, and especially when outsourcing to overseas contractors, there is a tendency to delay in finding and solving problems that occur locally.*

Going back to the meeting...

—As you understand, we are facing many things and troubles —the Accounting Manager pointed out—. The things and problems are:

- Sales expansion;
- Outsourcing trouble: quality concern, production plan, and delivery;
- In-house excess capacity: labor, machine equipment, and construction (even though temporal).

—Our headquarter has one success experience about the fighting a last-ditch battle (burn one's boats). We did both of factory scale expansion and sales expansion simultaneously and succeeded. Then, at this time also, we took the strategy of "burning our boats" for business expansion. However. We had the deadlock of sales expansion —the Accounting Manager finally expressed.

—Do you understand Mr. Kimura —asked me as if I was nearly stupid—. The problem is the Sales department and not the Toilet. Mr. Sales Manager. How do you take responsibility?

—Cannot be sold. —the Sales Manager pointed out—. Our products cannot be sold, because of the prices, quality, and delivery. And, particularly, the prices. Please don't follow the old dream and success story. Cannot be sold!

I omit the speeches of several managers then, because as far as I could see it was a futile dispute.

—It is very strange —I expressed them—. It is indeed a weird company. Yes, your company is. There was a word about medium-term strategy by Mr. Accounting Manager, and I guess you have the company's future vision and medium-term strategy. However, you may not have the intention of following this vision and medium-term strategy, and policy control intention.

—By the way, when we walked around to look at your factory, I felt one thing —I continued—. I said that your company has all elements of unprofitable or all visibility phenomena of a bad factory. The 3 elements are Dirty, Non-understandable visuals, and a lot of stuff. And I add one more: Your employees have no liveliness, joy of production, and even pride in production. Of course, your factory is not a harsh workplace like the movie Modern Time of Chaplin, but has a leaden and inorganic atmosphere...

—Mr. Production Manager, I hear you are making **Gemba-Walk** every day, you are? —I asked figuratively—. It is a good thing. But I think you are on the opposite side of Executive Fellow (TOYOTA Vice President) Mitsuru Kawai. He is called **Oyaji-San** by the **Gemba** employees. **Oyaji-san: Dad**.

—He is walking across the **Gemba** not only checking abnormalities but also making communication with employees. And the place where he visits has a familiar atmosphere with people.

I rather prefer to omit now the rest of my speech and explain just one concern: When thinking about the Thinking environment in a factory, the highest impact item is the human relation environment. And, I picked up 4 items of thinking environment as below:

- 1) Dialogue in diversity and reading books: Be induced by another idea;
- 2) Idle walking, chattering, sunbathing; Brain relaxed;
- 3) Time absent-minded, simple repetitive work, power-nap, and release, physiological needs (including Excretion): Brain blank and openness;
- 4) Short exercise: Brain refreshment and blood circulation.

And in here, I would add 5<sup>th</sup> item which is:

- 5) **Human relation environment**. In a factory, one of the fatal items which give strong stress to employees is bad human relations.

Somewhere, I wrote the episode of Mitsuru Kawai: Vice President of Toyota which is called **Oyaji-san: Dad** by the **Gemba** people. And, He, himself, is making an effort to maintain good human relations in **Production Gemba**. I believe that he or his act is a really good teacher for us.

Then:

- 5) Good **Gemba** Human relation: To avoid bad mental stress in the **Gemba**.

Now I come back to the main topic: **Thinking Environment**.

I described the Thinking environment from the condition of working circumstances. Now I need to write the Thinking environment from another side. The key word is "Convenience".



## Convenience

The catch copy is "Convenience is an enemy of **Thinking environment**". "Mobile-holic destroys brain".

Please understand, I'm writing about TQM. However, some companies are asking me about the teaching of TQM. And when visiting a small or medium company, no matter what, I can see the situation of quality level and capacity. And I feel the sense that TQC is in crisis.

## Story of a company

I introduce a story about when I was asked to give a lecture by a medium-sized manufacturing company. The title was very simple and "Quality improvement". The attendees were newcomers and up to about 3 years engineers and a total of 13 members. And the duration was 3 days course.

I omit the contents of my lecture but write just my concern.

On the first day, I started the lecture as usual (The Tools of Statistical Quality Control) based on the current quality data of this company. And I felt uncomfortable. This feeling is not the first time and some by other manufacturing companies. The students cannot keep their attentiveness.

What???? ...In lecturing, somebody's mobile phone began to vibrate (the sign of an incoming call). Then I required them to switch off their mobile phones. Later on, I restarted my lecture, but their attentiveness couldn't be kept so long. I thought that they fell into mobile-holic (smartphone-holic).

In the thesis, it says that their keeping attentiveness of the millennial generation who are the digital native generation is about 9 seconds which is the same level as a goldfish.

Goldfish level!? ...Anyway, they couldn't keep their attentiveness for so long. Then, I suggested the company's directors stop the QC lecture by causes of their unusually poor keeping attentiveness and instead of this lecture I suggested a diagnosis of digital-holic.

—Mr. Director —I said—. Your engineers have a serious disease which I call mobile-holic. According to a survey, it is said that the keeping attentiveness of a patient mobile-holic is 9 seconds and the same level as a goldfish.

—As you felt, it is not possible to leave quality concerns to goldfishes —I expressed—. Anyway, they couldn't keep their attentiveness for so long.

This story is a very recent year and after this story, the Pandemic of COVID began. And, my concrete suggestion was to provide a Digital Detox opportunity to the employees.

—Anyway, there is no meaning to continue my lecture in such a condition. The purpose is to improve the circumstances of quality improvement. And, when making conversations with your engineers, I felt some worries. Their act when occurring a quality concern is.

1. Recognizing the phenomenon of problems.
2. Trying to find the solution. But the solution has the trend of just finding defects.
3. Then, find a (temporary) solution to continue the production.

Confirming the facts. Investigating the root causes by 5Whys or Fishbone. Trial & error and improvement of the ideas. Confirming the effects. Standardize.

These processes were missing or lacking.

—From now, the essential factors for an engineer are insight and creativity. Let's stop the QC course. And instead of this, please plan a digital detox —I wrapped up.

—Digital Detox? What is it? —asked the Director.

—For example, I say mobile-holic (poisoning of a mobile phone) —I explained to him—. In the middle of this lecture, it was provided a rest time. It was 15 minutes. It is the time of rest. However, most of them began to check and see their mobile phone. Repeatedly, it was a rest time for refreshing the brain.

—Director; ??? ...What is the problem, sir? —the Director asked surprisingly—. In the rest time, checking mobile phone should be free and can be a refreshment.

—Oh, oh, -I felt really expected)—. Mr. Director. The making brain rest is to be dazed by no thinking. And, looking at or checking a mobile phone never gives a brain rest. It is against it...

—According to a book, it says that overuse of digital devices causes brain damage. However, I'm not a specialist in the brain. Even though, I can look at the current phenomenon of the current young generation who has the *mobile-holic*. And I could make sense of the book is correct. Your employees are typical —and I continued...

—Mr. Director —I called his attention again—. I suggest you the planning of Brain Health Improvement. And, again, it is no meaning to do my QC lecture to your people. Let's stop it. I guess your Human Resources department has an idea.

—Nowadays, mobile phone is very convenient. This is like as mobile computer, which has the function of IT (Information Technology) and computer. It is anyway convenient. But this convenient tool is giving very serious problems to engineers. No. The very bad influence is given not only engineers but also all people including children.

—Mr. Director. At present and from now, the necessary thing for your young engineers is the capacity of Why (having a question, doubt). Because, nowadays, the young generation cannot have a question about phenomena.

—What is that butterfly? ...Why is it in the conference room? ...Why is a butterfly in this season? —I asked figuratively because I didn't expect any answer—. They saw the butterfly. But nobody had the question, even though I pointed it out.

—I have tried to use the whiteboard. However, the marker pens were unable to write. Then one student went to the next meeting room to get some marker pens. But these were also unable to write...

—They went to the toilet before the course. And they must have seen the faucet which water is leaking. Then, I questioned them which was the faucet and why and from when the water leaked. ...Also I questioned them about the color of the corridor lightings. Actually, one lighting is a different color. But unfortunately, their answers were very ambiguous...

—Mr. Director. Please don't misunderstand. I'm not blaming your company's situation. But I'm telling you my concern about their indifference and no having the sense of "What & Why". They don't have questions or interest in the phenomenon. No, this representation is not correct. They cannot have the sense of "Why & What"...

—It is not a thing of no feeling against the unique phenomenon, but they can feel it. However, they don't have any doubt or interest. Mr. Director —I finally pointed him out—. You asked me about the lecture. Probably, you might had feel something of an anomaly, had you?

My professional field is factory management by TPM, TPS, TQM, and Kaizen. And long years yes long years, I'm teaching these. And now I'm facing the biggest crisis. For a few years, I saw such a phenomenon. First, I felt a sense of incompatibility with some limited persons. But, my feeling about the sense of incompatibility is increasing. This company's case is typical. And other factories may be not like this. However, my worry is never needless anxiety. Because the AI improvement speed too fast and the human brain not to be able to adopt to it.

Again, I'm not a specialist in the brain and the AI influence. However, I can understand the doomsday (brain collapse) trend by watching factory engineers.



## "Brain overwork by smartphone" or "Overflow brain"



*Is such a thing in TQM?*

*At first, you may have a question why I'm writing such things in TQM.*

*And you may say that it is necessary to concentrate on just TQM issues. But I will ask you what is TQM and what is its aim for you. Of course, it is quite clear that is to improve quality and for it to be maintaining the system to keep continuation. But at present, your employees are becoming losing the necessary capacity to these aims. Fishbone & 5Whys? FMEA or FTA? Taguchi Method? Root cause analysis? They are becoming not to be able to do these. Near future, most of these techniques will be becoming to be done by AI. However, for using AI, it is necessary to let eat and accumulate AI true food (true quality data). If you or your employees are deteriorated by such digital tools and conveniences, even using AI also will not be done.*

*One more time, if you wish normal TQM lecture, I recommend you buy a TQM textbook in the market.*

Next is just a little longer description, but I would introduce the harmful effect of digital devices.

The title is "Smartphone brain overwork memory and motivation decline!?" It was broadcasted by NHK (Nippon Hoso Kyokai: Japan Broadcasting Corporation) on 2019.02.19. I introduce the outline of this broadcasting. Indeed, I felt fear because Human is deteriorating.

The beginning of this broadcast was very shocking for me. And it said next:

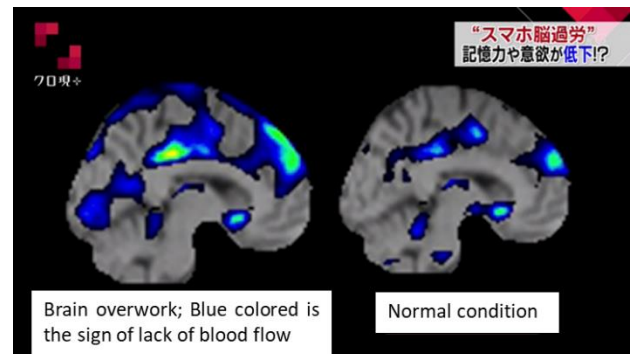
*Smartphones, which are indispensable to our lives, are causing controversy in the world of brain science. Reliance on smartphones can lead to forgetfulness, judgment, motivation, and a tendency to be unable to control emotions even in*

*the prime of life in the 30s to 50s. In the patient's brain, blood flow to the frontal lobe decreased. A huge amount of information such as text and images continues to flow in from smartphones, and it is expected that information processing will not be able to keep up. Some neurosurgeons have called it "brain overwork due to smartphones" or "overflowing brain", and debate has begun as to whether brain abnormalities are temporary or early symptoms of dementia. Tohoku University has also announced that children who use smartphones for long periods of time exhibit developmental delays in their brains. Some local governments have moved to regulate the use of smartphones by children. Under these circumstances, the attempt at "digital detox" is attracting attention.*

### "Smartphone brain overwork memory and motivation decline!?" ...

The brains condition compared to abnormal and normal are as next photos:

And the suggestion by a neurosurgeon doctor is "First of all, even if it's just for 5 minutes, please make time to be absent-minded without touching your smartphone." And the broadcast introduced another picture that explains the situation of Brain overwork and said that It is indeed a "Garbage House".



Information processing in the brain has three stages. INPUT for information. Then SEIRI by Default mode network. And OUTPUT such as speaking. However, if you use your smartphone too much when you should be absent-minded, this "Seiri of information" will not be done, so your brain will be like a Garbage house.



**i** “You may think that using your smartphone while resting is a break, but it is not a break. But actually, your brain cannot take a rest while you watching a smartphone. And the smartphone is the biggest cause of increasing "brain overwork".”

Some patients explain another phenomenon, and said next:

*No matter what I do, it doesn't resonate with me. And I feel like my curiosity has worn out.*

The point is, your brain gets tired. However, even if you are working or reading a book, don't you get tired? How is it different from looking at a smartphone? ...Because of using



a smartphone, there is a lot of information coming into your brain. For example, there is a lot of light, or there is a lot of color information.

Another thing is that smartphones can be used while doing something in parallel. You also maybe do such a smartphone while walking, chattering, looking at TV, or laptop. Alternatively, you can launch various applications on your smartphone to see, hear, and write about various things at the same time. This is so-called "multitasking", and I think that we are doing various things at the same time. However, our brains are actually not very good at multitasking.

According to a book, the human brain is the same as primitive age. In this primitive age, it is required to concentrate on one thing to survive. If possible, it is necessary to concentrate on one thing, but we can't do many things at the same time.

So, a brain is requested to switch quickly. I think that the stress that builds up in the brain is the cause of the brain overwork that is happening with smartphones now.

That broadcast has introduced a case of Brain overwork. But, the case introduced here now is a famous and popular announcer in Japan.

He got the diagnosis of "Smartphone-based risk check test for brain overwork" based on the 3 checklists. These 3 checklists are **Behaviour Check**, **Brain Check**, and **Health Check** of mind and body. And the results are as next, for you to use them for your employee's diagnosis:

Behavior checking	
✓	Your smartphone is always on standby
✓	Take out your smartphone when you have time
✓	When in doubt, search straight away
	Take a "photo" to remember
✓	You can't go to a new place without your smartphone
✓	Everything you research is in your smartphone
✓	Always pressed for time
	Afraid of missing out on information
	Mishearing (imagination) ringtones and vibrations
✓	Using a smartphone in bed at night

Brain checking	
✓	Forgetfulness has increased in recent years
✓	The names of people I know don't come up right away
✓	Come to get something and forget its purpose
	Forget the promise
✓	You can't remember what you did three days ago
✓	You can't name three "topical news"
	Recently, you can't write kanji (word) correctly
	Recently, you make a mistake in a single calculation
	You don't remember the thing that can be found by searching
	You rely on your smartphone and can't remember the way



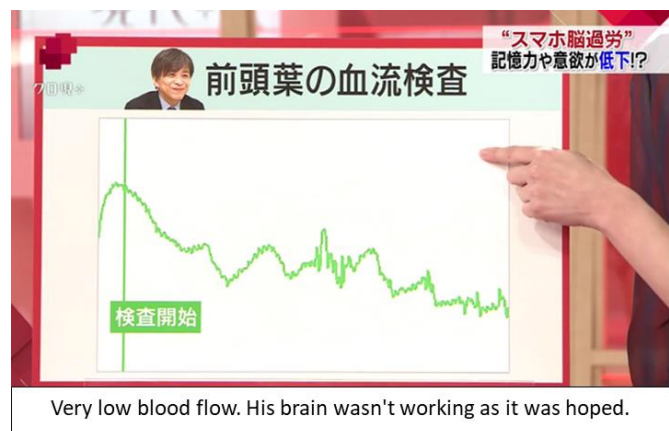
Health Check of mind and body	
✓	Head and body are tired all the time
✓	Get annoyed and stir feelings in
	Always sleep deprived
	You have various bodily disorder
✓	You can't concentrate and you make more mistakes
✓	Unmotivated and uninterested
	Immediately feel depressed
	Arrangement got worse
	You haven't laughed much lately
✓	You become insensitive to the change of seasons

In the 30 items introduced, 17 of them were checked. But according to the doctor who created the test, if 20 or more of these are correspondent to it, it is a "high risk", and 10 or more was a "medium risk". So he was at "medium risk".

The items recorded many on his checklist were the very first "behavior pattern". And it is easier to refresh when he changes your habits.

"Smartphone brain overwork"

Decreased memory and motivation!? ...He was rated "medium risk" in the above test. Before this check diagnosis, I examined the brain. It is to measure changes in blood flow in the frontal lobe by answering a simple test while wearing a measuring device (measurement of minute current). The result is the graph below. This was a surprising result.



Is my brain not working? ...It was indeed a surprise. He is a top-active announcer. But his daily smartphone usage is deteriorating his brain. After this test, he got the (training?) course (2 nights 3 days) of Digital Detox.

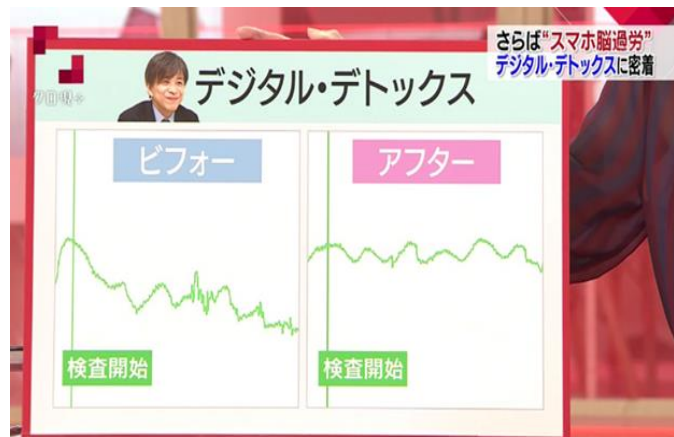
I omit writing of the detail of Digital Detox Course. Please check by yourself.

Actually, he couldn't get sufficient effect of this course, because his course life was monitored by many cameras. This was one of the broadcast plans by NHK. Therefore, his act was watched by many cameras.

His comment:

*There are 8 cameras, and the staff comes in to replace the memory around dawn. Every time there was a loud noise, he couldn't sleep. I can't rest my mind, or rather, my brain can't rest. In such a situation, it's pretty hard to do this, isn't it?*

*However, there were the effects shown by the Blood flow test as right picture:*



## Daily Digital Detox.

Above is an example of a Digital Detox Course. But more easily it can be done in daily life. And I write recommendable examples next:

- Don't bring your smartphone into the bath, toilet, or bedroom;
- Don't check your smartphone as soon as you wake up;
- Refrain from using your smartphone while eating or talking;
- Take a habit to think for one minute in your brain, before searching on a smartphone;
- Take notes by hand when searching in SNS;
- Doing simple tasks like washing the dishes, shoe polishing, cleaning & laundry drying;
- Actively taking walks and sunbathing;
- Light exercise, Stepping up and down;
- Valuing seasonal foods and events.

I don't say it must be done everything at once. And it is easy, isn't it? But the most difficult thing (for you) maybe to leave from a mobile phone (smartphone) temporarily.

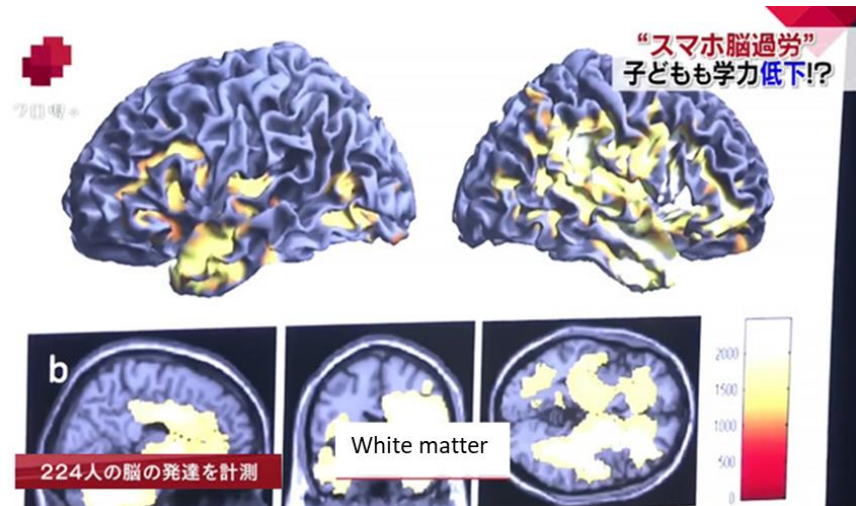
As an aside, a smartphone threatens the brain without knowing it.



**For children, data are suggesting more severe effects.**

*The bad influence of smartphones is being reported. And it affects brain development and is so serious.*

*When examining the brains of children who spend long periods of time on the internet using smartphones, yellow areas stood out. It seems that the development of "white matter", a collection of nerve fibers that connect the whole brain, is delayed.*



And the professor commented next:

*“This is the first time I have come across something that has such a wide range of adverse effects. It is predicted that it will have a negative impact on children’s memory abilities themselves. I think that it would be happier for the future if we forcefully restrained them from using them for more than one hour.”*

Is **convenience** a good thing?

Please don't miss the way. I'm writing the theme of **Thinking Environment**.

Now we need to think Convenience is good or not. "Convenience is an enemy of a **Thinking environment**"

At present and in the era of IT and AI, the world became and is becoming more convenient. In the last edition, I wrote that convenience is not a bad thing. And it is to depend on the usage of the time usage created by the convenience. However, I need to tell you that an important opportunity is lost by just Convenience.

And I believe that to keep a healthy brain, it is necessary to be in just inconvenient circumstances. The cycle is Inconvenient, Thinking of Kaizen and Improvement action and repeating this cycle.

Please don't misunderstand. I don't say that it is necessary to abandon all convenience, but I'm suggesting that necessary to prepare inconveniences in daily life and working shop-floor intentionally.

I believe "**Convenience** is an enemy of the **Thinking environment**".

The benefit of Inconvenience? ...It is a benefit obtained by "inconvenience". Specifically, the first point is that it becomes your own thing. If the things don't go automatically and are inconvenient, so it's a benefit that you can take care of yourself and devise it. There

is no room for ingenuity when things proceed with a one-touch type (such as a machine). (In the process of taking the time and effort, etc.) There will also be opportunities to encounter unexpected things.

And it is being studied by other countries.

Overseas, there is also a movement to apply the concept of Benefit of Inconvenience to businesses and services. For example, researchers at Harvard University in the US call inconvenience benefits "Beneficial Inconvenience" and conduct experiments on health and happiness. In addition, researchers at the University of London in the United Kingdom call inconvenience benefits "Inconvenient Design" and are researching urban planning and architecture. These studies show the possibility of extending the concept of inconvenience benefit to various fields.

### Case-1. Production Gemba

For example, the Cellular production system. (Making Stream of Production-2<sup>15</sup>).



The "Cellular production system," in which one or a small number of workers are responsible for the assembly and completion of a product, I often introduce as example. The "line production method" (where each worker waits for parts on a conveyor belt and repeats the same work) is convenient for mass-manufacturing a single product. Long days ago, I teach **3Ss** which are **Simplification**, **Standardization**, and **Specialization**.

On the other hand, the cell production system was introduced in order to respond flexibly to high-mix low-volume production. However, each worker has enough skills to assemble a light car, and when workers recognize this, their motivation rises, which leads to further improvement of their skills and the discovery of new improvements.



<sup>15</sup> Making the stream of production 0-14:

[https://archive.org/details/makingstreamofproduction13\\_202001/Making%20stream%20of%20productio%20n-1/](https://archive.org/details/makingstreamofproduction13_202001/Making%20stream%20of%20productio%20n-1/)

The cellular production system is used to be a full method when looking at it from the side of management. And it is also a much better system than the image of the movie "Modern Times", from the point of human brain activity.

*Making the stream of  
production 0-14 in Internet  
Archive*



### **Cellular production system and robot.**

*Just a small digressing from the subject...*

*When looking at the trend of cellular production, the use is declining. However, my point of view is it should be used more in the era of RPA (Robotic Process Automation) by the combination of Humans and Robots.*

*The advantages of Cellular production are:*

- 1) *Synchronization advances and production lead time shortens.*
- 2) *Decrease inventory and work in process, and improve cash flow.*
- 3) *Improve productivity.*
- 4) *Improve quality and reduce defects.*
- 5) *It can flexibly respond to high-mix low-volume production.*
- 6) *Shortening of changeover time.*
- 7) *Line change is possible without requiring excessive capital investment.*
- 8) *Awareness of "our line" enhances workers' morale.*
- 9) *Small improvements on site are promoted.*
- 10) *Securing space by improving area productivity.*

*Is it not RPA, if intending the process of robot and human combination?*

*Now there are many cases of human & robot collaboration process.*

*"Unbreakable, informs  
before it breaks, can be  
repaired immediately if  
broken"*

*This is the slogan of FANUC. And  
photo left is an automatic (robotic)  
assembly line. All process is done by  
the robots.*

*Of course, including the inspection  
process and collaborations with  
robots.*







### Case-2: Barrier-free (accessibility) environment

I recently visited his mother with a friend. She is in a nursing home now. And I was surprised. It's not a barrier-free (accessibility) environment.

One of the impressive examples is a care facility that intentionally incorporates barriers such as stairs and long corridors under the concept of "non-barrier free (non-accessibility)." Barriers are inconvenient for the elderly, but if they lose them, their legs will weaken and they will not be able to walk. A barrier has been set up to prevent this. It has the benefit of being rehabilitative (which restores physical ability) and gives the elderly more autonomy in their lives (releasing the over-care of nursing homes).

I am originally in a position to create things (so-called engineers).

Until now, engineering has created things that save people the trouble of doing things, or that take the place of people. However, I think we should consider whether it is actually correct. Would a world where people stop doing anything really be fun? We should understand the importance of creating room for independence and ingenuity precisely because it is inconvenient. If we look at things from the point of view that there is a benefit in inconvenience, we can think of the relationship between people and things that should exist.

Does being convenient give you pleasure? ...Of course, there will be many such cases. No, maybe in most cases.

### Case-2: Walking:

Walking is a very important function. According to one book,



Acquired gait disorders can have a variety of effects on the brain. Gait disorders include several problems, such as decreased walking speed and loss of smoothness, symmetry, and synchrony. Impaired gait may also impair cognitive and executive functions in the brain. It has also been reported that gait disturbance is associated with brain lesions such as cerebral atrophy and white matter lesions.



This is a special feature of NHK (Japan Broadcasting Corporation).

If you look closely, there are steps and slopes everywhere in the facility. The aim is to naturally strengthen the legs by creating a barrier. At first glance, it may look difficult, but there are some tricks to attract the elderly. After overcoming the stairs and slopes, there is a “paradise” where massage machines are lined up. An elderly person who used it said, "It feels good. I can't use this massager until I come here, so I'm going up the stairs."

The above one is an extreme example. And, the aim is mainly to keep a healthy body. But according to a report, this inconvenient substantiated the keeping a healthy brain. And even a healthy body person is necessary to walk. Because it is expected to have a serendipity.

### Case 3: Story of pencils.

This is my family's story. Actually, it is one story of my grandson.

One day, I presented him with some pencils and a knife rather than a ballpen or mechanical pencil. Then, his mother (my daughter) got angry with me, because of danger. I told her that we used pencils and knives at a young age.



She spoke to me: —Papa. This era is different. Nobody uses a knife to cut & sharpen a pencil in a new era. And it is dangerous. I give the correct stationaries to my son.

Then she gave her son pencils & a mechanical pencil sharpener and mechanical pencil. In the end, unfortunately, I was overwhelmed by my daughter.

However, I need to say that this convenience gave a handicap that he cannot use a knife so far and from now.

Not being able to use a knife is not only about this but also to lose the opportunity of devising something. Fingers are connected to the brain. And fingers are said to be the

second brain. Moving your fingers can increase blood flow to the brain and stimulate brain cells.

This is because it stimulates the sensory and motor areas of the brain, leading to activation of the brain and improvement of cognitive function. Also, for example, research has shown that changes occur in the brain representation of the hand by artificially wearing and using the third thumb.

It seems to be effective to play instruments such as piano and violin. Then, **convenience** is destroying human ability.



### Story of mobile phone (continuation...)

Indeed, I really think in my head: "Damned bloody, Mobile phone you do a bad deed!"

I don't have a smartphone (mobile phone). It is very convenient. I know the convenience of it. One day my Chilean daughter visited us. And when going back to her country and to a wide station, she used the automatic audio guide of her mobile phone to reach the concourse. And she said: —I can go anywhere if having a mobile phone.

I know, I know. It is very much convenient. Soon, mobile phones will have the function of simultaneous interpreting function. No. It is wrong and it is already now. But I never want to use it. To use it is to abandon or to have deteriorated one of my functions.

Perhaps I'm overthinking? ...My case. I think you already know *ChatGPT*. So, "*ChatGPT*" is a natural language processing model optimized for dialogue, in which questions are input as text, and answers are output in natural sentences (LLM: Large Language Model) by AI.

Then, I tried to use it (which my young US friend installed it. Feb 2023). It is indeed interesting. But I understood that it is only the chat tool. And I lost interest to use this.

However, after this use trial, some TV information told that this can write a paper in a very natural style. But some cautions were informed about the accuracy of the content. Consequentially, rather than use *ChatGPT*, I tried *Bing Chatbot* which is a search engine able to write sentences like short papers in a natural style.

For me, it is very much convenient. But of course, it is necessary to confirm the information's accuracy. There are 2 reasons:

One is the answer: It is included the defect answers. And this point is the same as Wikipedia. Perhaps, such direct communication tools by AI will be improved more and will be convenient. But I will not want to use it.

Another reason that is important for us, and is there is no chance or less chance to meet serendipity. Thus, the current search engine of *Google* or *Bing* is required to write keywords. Then, *Google* or *Bing* is introducing many options which are included the keywords. Then, we search favorite papers.



This search process is good and important for me. We can meet very good papers unexpectedly. Even, though these papers maybe not be related to my original search, however, this encounter gives me the chance of other inspirations and ideas.

In the near future, Chat GPT is improved more. But this tool amplifies thinking bias. This tool will become more convenient, more and more. And mobile phone becomes convenient more and more. But please think "Is convenient good?" Can you intentionally leave inconvenience in your life?

Repeatedly I tell you. I'm writing TQM. Even, there are many texts such as DEMIAC of 6-Sigma, QC 7 tools & NQC 7 tools, FMEA, FTA, etc. But my biggest anxiety is that your engineers cannot use all these techniques (excluding a few specialists).

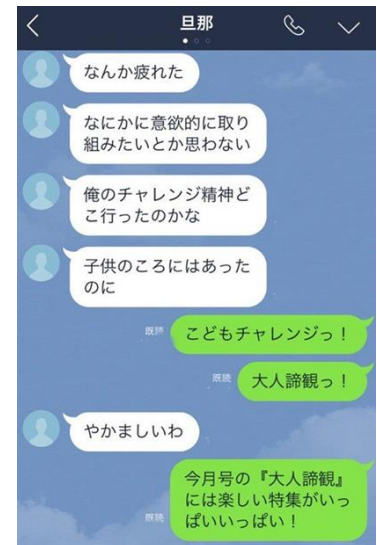
But what means "Excluding a few specialists"? ...As an aside. I think AI and IoT are expanding the "Knowledge differentials". And these "Knowledge differentials" will expand the Income differentials more and more every day to come.

Why didn't Steve Jobs let his child touch the iPad? ...According to a paper, on average, 4 hours a day, 20% of young people use mobile phones for 7 hours.

But the top IT industry leaders, including Steve Jobs, say they won't give their children digital devices. Why? ...Sleep disorders, depression, poor memory and concentration, poor academic performance, and addiction - the latest research reveals the reality that your brain will definitely be undermined while you are drowning in the convenience of your mobile phone.

Line: Internet Chat tool. Chatting with a very short message: They have lost the habit of thinking in words, the imagination constructed by words. And this loss of imagination is nowadays spurred by the Internet. It is the Internet language that spurs the loss.

Today's children's language proficiency is being shaken from the ground up by short text communication on SNS. And here, Chat GPT is coming. And young people increasingly abandon thinking for themselves. Please let me write about the toxicity of mobile phones which is a very convenient tool a little more.



## Game

I introduced the case of a company that asked me to make a QC lecture to its engineers.

When taking a short rest, some young engineers were concentrating on something on their mobile phones. It was a game. Computer Game. TV Game. Online Game. Game with a mobile phone. So, Game, game, game ...The world is flooded with games. And, the worst type is Games with mobile phones. Because it is possible to play at any time and anywhere.

I don't think it's an exaggeration to say that mobile phones control humans. What about games, for example? It can be said that this is an attempt to join hands with Brain science and technology.

According to a scientific journal, it is described that games have the characteristic of being a media that specializes in researching and applying how to stimulate the Brain reward system (Brain hormones such as dopamine and endorphins, which are pleasure substances, are secreted in the brain).

Of course, being passionate about something is never a bad thing.

But games matter. The problem is that this enthusiasm is not based on an individual's active attitude of "interesting!", but based on brain science. If so, humanity may now be standing at the doorstep of a terrifying future.

Isn't that a terrifying paper?

In the above, I wrote the case of *ChatGPT*, but let me just a little bit more.

I tried it by Bing. It is indeed convenient. The next is the contents of chattering.

I questioned in Japanese as a trial: "Write the examples of Benefits of inconvenient in life and possibly in bullet points". However, after getting the answer in Japanese, I also requested to write in English.

Then, I got the next answer:

*Yes, there are. Some examples of inconvenient but beneficial lifestyles are:*

- *Walk instead of taking a train or a taxi*
- *Write a letter instead of using LINE or email*
- *Brew your own tea instead of buying it from a convenience store*
- *Spend some time in the countryside instead of the city*
- *Use the concept of non-barrier-free to intentionally incorporate barriers such as stairs and long corridors in nursing homes*
- *These examples are said to have positive effects on health, communication, nature, and leg strength because they are inconvenient.*

*Are you interested in any of these examples? 😊*

I actually felt in my heart: "What convenient it is!" ...Even though, please understand, I know the importance of seeking convenience in development. It must be continued. However, another side, it is necessary to leave some "inconveniences" in your life intentionally for keeping your sound brain.



***The step of the Quality Improvement process is changing.***

*Next is an example of ChatAI use for a (dimensions) defect.*

*I questioned and fill out the next sentences: "Dimension defect happened in the machine tools. How to solve this problem? How to find the countermeasures? Let me know the steps in bullet points."*

*And after waiting 15 seconds. The next answer was shown in the ChatAI.*

*Dimension defect is a problem that occurs when the actual dimensions of a machined part deviate from the desired specifications. This can affect the quality and functionality of the product. To solve this problem and find the countermeasures, you can follow these steps:*

- *Identify the cause of the dimension defect. Many possible factors can affect the accuracy of machining, such as machine tool stiffness, tool wear, thermal deformation, cutting force, vibration, etc.<sup>1</sup>*
- *Measure and analyze the dimension defect using appropriate tools and methods. For example, you can use a critical dimension scanning electron microscope (CD-SEM) to measure and inspect the dimensions of semiconductor devices<sup>2</sup>, or a coordinate measuring machine (CMM) to measure and inspect the dimensions of mechanical parts.*
- *Adjust or correct the machining parameters or conditions based on the analysis results. For example, you can change the tool geometry, feed rate, cutting speed, coolant flow, etc. to reduce or eliminate the dimension defect.*
- *Verify and validate the effectiveness of the adjustment or correction by repeating steps 2 and 3 until you achieve satisfactory results.*

*Some examples of bullet points are:*

- *Identify cause -> measure defect -> adjust parameters -> verify results*
- *Cause analysis -> defect measurement -> parameter correction -> validation*
- *Find cause -> inspect defect -> correct condition -> check result*

*And I questioned with the next sentence: Let me know the analysis method of "defect cause". And then I got next:*

*Hello, this is Bing. 😊*

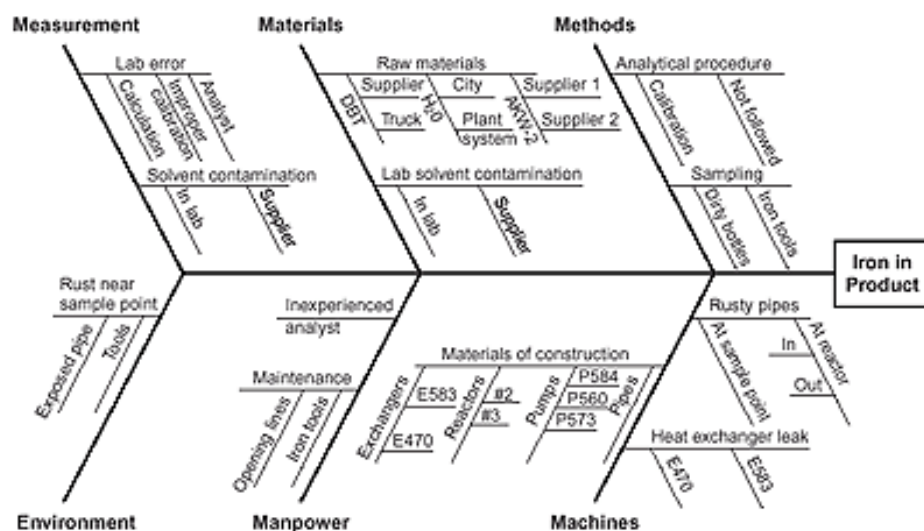
*A cause of failure is any condition that differs from the expectations stated in the software's requirements specification<sup>1</sup>. Defects also occur when tests fail to detect functionality or performance issues<sup>1</sup>. There are several ways to analyze the cause of a failure:*

- *Investigate the frequency and impact of defects*
- *Identify the conditions under which the failure occurs and the steps to reproduce it*
- *Use techniques such as the 5 whys analysis and the fishbone diagram to identify the root cause of failures*
- *Think about how to fix bugs and preventive measures*
- *Verify the effectiveness of bug fixes and preventive measures*
- *By analyzing the causes of defects, it is possible to improve the quality and reliability of software.*

*I think you understand what I'm telling.*

Actually, I'm telling you that I may lose one part of my consulting job which is to make a TQM course. Also nowadays, a commercially available textbook will be not necessary. Because such knowledge is overflowing in the internet space. It is indeed overflowing. For instance, if searching with the keyword of "fishbone diagram and examples", the site shows many kinds of examples. If questioning *ChatAI*, it shows many sites.

But, please be cautious, because most fishbone diagram examples are not useful for defect cause analysis and identifying the root cause, because of no 5-Whys in individual branches. And it is useful for just decollation. For instance, the below Ishikawa diagram is a poor example, because of the shortage of 5-Whys in each branch.



If I were a quality engineer, I would do following steps:

- Recognition of phenomenon
- Chatting with (for instance) *ChatAI*
- Digging by *ChatAI* and SNS.
- Repeatedly digging to identify the method. And repeatedly:
  - o Plan: Implementing the recommended method to find a solution.
  - o Do: Implementing the solution shown.
  - o And, Check and Action.

Well, what do you think? ...Do you need commercially available textbooks still? Do you need my boring lecture? ...I made an additional question to *ChatAI* (Bing).

The question was: "Do you think the appearance of Bing will change the steps of quality control carried out in the future?"

The answer was as next:

*Hello, this is Bing. 😊*

*You asked me if I think the way of quality management will change with the emergence of Bing, and you want me to answer in English.*

*Quality management is the process of inspecting, verifying, and ensuring the quality of products or services to achieve customer satisfaction and quality management 123. Bing is a useful tool for quality management. Bing provides fast and **accurate search results** that allow you to easily access information and knowledge about quality management. Bing also supports visual analysis and comparison in quality management by using various media such as images and videos. Furthermore, Bing offers advanced features such as prediction and optimization in quality management by using the latest technologies such as artificial intelligence and machine learning.*

Really, I thought in my heart: “What a hateful fellow it is! What a haughty it is!”, However, I think that the way of quality management will become more efficient and effective with the emergence of such AI technology. But...

I need to refute its haughty by 3 points.

One is **it is necessary to pay attention to AI Chat accuracy**: Such AI Chat is using the article of internet space. And the information is not necessarily correct. And the accuracy of the internet space article is like a "mixture of wheat and chaff, thread and thrum, truth and fake".

Therefore, you are requested to have the capacity of identifying truth or fake and also experiences in Gemba. Thus, what I'm saying is “you need to have a certain level of **skill**”. After all, you need to read books. A book is generally written correct things.

Another is even **ChatAI cannot show the final answer**. For instance, FMEA (Failure Mode Effect Analysis). As you know FMEA has Process FMEA and Design FMEA. Here, is one assumption, you asked about the steps of FMEA implementation for the new production line start.

Consequently, the question to *ChatAI* is: “Let me know the steps of Process FMEA implementation”. And very soon following as shown below.

*The answer is from web search results. The steps for implementing FMEA are:*

- *Scope and objective definition*
- *Structure analysis*
- *Function analysis*
- *Failure analysis*
- *Risk analysis*
- *Optimization*
- *Results documentation*

Probably, it may not be understandable to anybody. Then, again you asked *ChatAI* to show a more concrete method. And, then, it was shown very soon as next.

*The process FMEA implementation steps shown are as follows:*

- *Clarification of points of change: Write out work procedures and contents to identify points where changes occur.*
- *Identifying points of concern for changes: Assume various defects and troubles caused by changes.*

- *Determining Failure Modes: Categorize concerns as failure modes and fill in the failure mode review sheet.*
- *Impact/occurrence/detection analysis: Evaluate the impact, occurrence probability, and detectability of each failure mode, and calculate the risk priority number (RPN).*
- *Examination of improvement plan: Propose and implement improvement measures for failure modes with high RPN.*

This answer was constructed from a web page and web search results. That's very good! ...It is more concrete. However, still, it is not shown the final answer. But it is final as *ChatAI*. By any research in *ChatAI*, you cannot reach the final answer which you desire.

*(Publicity)*

*I can do the FMEA with you to reach to final answer which is adapted to your products. Also, another good point is to train you for future necessities.*

Now, you probably understand.

Even *ChatAI*, cannot provide the final answer which you need. Of course, he can show the necessary steps as above. However, considering the characteristics of your own new products (which are not universal), he cannot provide the answer, because of no data in any SNS.

And finally, you need to make the final answer by yourself: "Capacity of creativity, Capacity of Doubt and Why"

Repeatedly I need to say that the concern is your capacity of "**Doubt & Why**". Unfortunately, the young generation is already *mobile-holic* or *sartphone-holic*.

Their characteristics are:

- Not to sympathize with a thing (book or. like as karaoke ringing in the distance);
- Honest (acquiescent, obedience); Using the idea of SNS with no question;
- No thinking on their own;
- Thinking bias (lost thinking flexibility).

I speak badly for the young generation all the time. However, it is quite clear that you need to use such people.

Somewhere, I wrote that current jobs are disappearing and are being replaced by AI and RPA (Robotic Process Automation in the production process). And, other words, the jobs (necessary capacities) as a human are the jobs of "Creativity, Kaizen, and Negotiation (which includes face-to-face communication)".

What can you do? ...How can you educate, train and use Z Generation (who is Digital Native generation and like aliens)?

Anyway, before education and training, you need to prepare a proper environment. Then, I suggest preparing the **Thinking Environment**. And I show the checklist below (which will be involved in the Factory Management Checklist). I will write the theme of the **Thinking Environment** in this TQM series at every opportunity.

Theme: 12		Check Items	Check Points	Points & Comment
Thinking environment	1	Company Administration	Diversity employment and encourage individuality.	
			Company's clear mission and vision and its transparency.	
			Flexible working hours.	
			Kaizen (A): Improvement suggestions for any items.	
			Comfortable work space (B), Rest area, cafeteria and toilet	
			Counseling for employees: Advice on relationships, hobbies, health and life.	
			Company and Gemba beautification: Trees, shade, flower beds, fountains, ponds, benches.	
	2	Manager's knowledge	Encouraging both collaboration and independence at work	
			Recommend KJ and brainstorming	
			Correct answers don't matter, many ideas matter	
	3	Gemba environment	5Ss	
			5Ss: Around the factory and backyard	
	4	Work style	Short 5S of jigs and tools before work	
			Short 5Ss around you	
			Exercise before work	
			Routine job to be automated	
			Meeting rules: Pre-meeting stretches, Rest and stretching, Smartphone ban, Handwritten notes.	
	5	Rest rule	Light exercise, no smartphones,	
	6	Easy digital Detox	No digital devices allowed, Chatting outside of work, sunbathing, to be absent-minded, walk (backyard)	
Total		6		/30
Points: 0..5				%
	A	Not only the work related Kaizen, but also working environment.		
		Illuminance, temperature, humidity, ventilation, noise, calm music color coordinate.		
	B	Since it varies depending on the type and product at the factory, it is necessary to set up by your own survey.		



### III. Cognitive Bias

When looking the quality improvement activity, for instance, defect analysis and deciding countermeasures, the biggest barrier is Cognitive Bias. It is indeed a nasty phenomenon for quality control.

So, what is Cognitive Bias? ...According to Wikipedia, it is explained as next.

*A cognitive bias is a systematic error in thinking that occurs when people are processing and interpreting information in the world around them and affects the decisions and judgments that they make. The human brain is powerful but subject to limitations.*

*A cognitive bias is a systematic pattern of deviation from norm or rationality in judgment. Individuals create their own "subjective reality" from their perception of the input. An individual's construction of reality, not the objective input, may dictate their behavior in the world. Thus, cognitive biases may sometimes lead to perceptual distortion, inaccurate judgment, illogical interpretation, or what is broadly called irrationality.*

*Although it may seem like such misperceptions would be aberrations, biases can help humans find commonalities and shortcuts to assist in the navigation of common situations in life.*

*Some cognitive biases are presumably adaptive. Cognitive biases may lead to more effective actions in a given context. Furthermore, allowing cognitive biases enables faster decisions which can be desirable when timeliness is more valuable than accuracy, as illustrated in heuristics. Other cognitive biases are a "by-product" of human processing limitations, resulting from a lack of appropriate mental mechanisms (bounded rationality), the impact of an individual's constitution and biological state (see embodied cognition), or simply from a limited capacity for information processing.*

*A continually evolving list of cognitive biases has been identified over the last six decades of research on human judgment and decision-making in cognitive science, social psychology, and behavioral economics. Daniel Kahneman and Tversky (1996) argue that cognitive biases have efficient practical implications for areas including clinical judgment, entrepreneurship, finance, and management.*

This description is generally correct, in reading other several papers. Again, it is the biggest barrier to quality improvement.

Actually, the company that asked me for the TQM lecture for young engineers had trouble with quality improvement. This company also fell into the pitfall of the quality improvement death cycle. And as a result, a common phenomenon has occurred. Reoccurrence of the same defect, same countermeasures proposed and implemented, but reoccurrence, etc.

How does Toyota do? ...In the effort to build a stream of production, a Problem occurred, and some temporal countermeasures are taken to avoid the line stop. On the other hand, a thorough investigation using 5-Whys is made, and some thorough countermeasures are designed for reoccurrence.



Is 5-Whys an easy tool? ...No, it is not. And the most difficult is to find the (not true, but) facts in avoiding Cognitive Bias.

Please be careful, once again, Truth is a subjectivity by individuals. The most important thing to investigate quality problems is to find (objective root cause) Facts.

Now it is time to come back to the company I was talking about a few pages before.

I told to the Director: —Your engineers have triple pain, have they? ...One is a lack of management. Another one is a lack of engineers' ability to perform including motivation. And finally, the last one is a poor ability to ideas (against the finding root cause and solution to the quality problem).

—One of the causes of such poor ability (to find facts and solutions) is cognitive bias. (The meaning of "One of" is not to be included in the motivation.)

Even if it says **Cognitive Bias**, in fact, there are many kinds as next. The kinds of Cognitive Bias:

Confirmation bias, Illusion truth effect, Fundamental attribution error, Emotional bias, Certainty effect, Cognitive dissonance, Concorde effect (sunk cost effect), Pygmalion effect, Observer bias, Self-Serving Bias, Egocentric bias, Consistency bias, Conjunctive fallacy, Conservatism bias, Projection bias, Majority bias, Survivorship bias, Ingroup bias, Bandwagon effect, Snob effect, Normalcy bias, Present bias, Hindsight bias, Representativeness bias, Status quo bias, Endowment effect, • Loss aversion, Dunning Kruger effect, Framing effect, Peak end effect, Primacy effect, Halo effect, Anchoring effect, Barnum effect, Information bias, Optimism bias, Pessimism bias

So many, isn't it? ...I omit to explain each one of the kids, but just a little.



### Confirmation Bias

Confirmation bias is a **Cognitive Bias** that only collects information that is convenient for you or that supports your beliefs and hypotheses and does not try to collect information that goes against your opinion. And then, it has the characteristics below.

- You become less likely to notice errors in your own thoughts and hypotheses.
- I think my ideas and hypotheses are too true.
- It is difficult to notice small failures, and it is easy to lead to big failures.
- Overestimate even the rarest probabilities
- make you overconfident
- Ignoring facts and evidence

In fact, you tend to like people who share your opinion and dislike those who disagree with your opinion.

The latest functions that use algorithms in SNS, etc., which are often seen in recent years, reduce the chances of seeing dissenting opinions on the site, making it easier to amplify confirmation bias.

It is necessary to understand that refutation is also for your own benefit.

In the **confirmation bias**, the most familiar case is past success experience. This is a very strong enemy for thinking of problems and countermeasures. Illusion Truth Effect is a cognitive bias that encourages people to believe that something is true and to defend it after repeated viewing or listening. For example, "This countermeasure has worked well until now, so this countermeasure must still be correct."

Because the brain perceives reality based on what it has learned, it has the characteristic of adding truth to what is familiar.



### Fundamental attribution error

Fundamental attribution error is a **cognitive bias** that emphasizes internal factors such as individual character and temperament and neglects situational factors when explaining and evaluating individual behavior.

For example, when visiting a factory, one thing to be aware of is that "the first impression may overlook the essential part of this factory". For instance, the impression of the person who attended to you, and the impression of the factory at first glance (dirty, etc.) gives us a misunderstanding of the essential part of the factory.

Also called "basic attribution error," "basic attribution fallacy," and "correspondence bias" (Daniel Gilbert et al.).



Malcom Gladwell in  
Wikipedia [eng]

It is defined by Malcolm Gladwell<sup>16</sup> as "the extrapolation of measured features to irrelevant features":

- This person's dress is slovenly, so it's probably slovenly accurate.
- The machine is dirty, and then it cannot make a good product.
- This factory is clean and well-managed.
- This person is beautiful, so she should be able to work.

It's a cognitive bias that makes you recognize it like the above.

Fundamental attribution errors, once formed, it is said to tend to be difficult to correct.



### Cognitive Dissonance

Cognitive dissonance is a **cognitive bias** that tries to justify by changing cognitions that are inconvenient to oneself in contradictory cognitions.

<sup>16</sup> Malcom Gladwell [eng]: [https://en.wikipedia.org/wiki/Malcolm\\_Gladwell](https://en.wikipedia.org/wiki/Malcolm_Gladwell)  
[esp]: [https://es.wikipedia.org/wiki/Malcolm\\_Gladwell](https://es.wikipedia.org/wiki/Malcolm_Gladwell)

In order to eliminate dissonance, we change the definition of cognition, add new cognition, underestimate it, and change our attitude and behavior.

For instance, If you know that smoking is bad for you, but you still smoke, you add awareness such as “There are cases of Smokers live long lives without getting sick” or “It's a good way to relieve stress and be healthy” and attempts to resolve cognitive dissonance.

In other words, it is a phenomenon that occurs when you are doing "consistency".

- When a lot of effort has been put in and you don't want to deny it
- When you don't want to change (when you want to keep affirming)
- When you can't admit your mistakes
- When your thoughts and actions conflict
- When troublesome
- When you want to escape

It becomes easier to wake up.



### Consistency bias

Consistency bias is a **cognitive bias** that finds temporal consistency and arbitrarily interprets and modifies it.

- Because it was like this in the past, it will be like this in the future.
- This product is xx, so it must have been xx in the past, and it will also be xx at this time.

It refers to things like.



### Conservatism bias

Conservatism Bias is a **cognitive bias** that makes us unable to accept new information and facts quickly and stick to our original thoughts and predictions.

It can't be just evaluate anything other than my own way, and sometimes I deny it because of biased prejudice.

Anyway, Cognitive Bias affects some making decisions (such as countermeasures of defect, seeking facts, and root causes). And its influence is very serious.

So, how can we avoid it? ...According to a paper, next is recommended.

- Objectively verify your belief (prejudice)
- See things from different perspectives

- Listening another opinion
- To relax

What do you think? ...I had some questions and doubts about the above ideas.

"Objectively verify your belief (prejudice)"!? or "See things from different perspectives"!? ...Are these possible by the person who has the trend of **Cognitive Bias**? ...Can you be conscious of it?



### **Metacognitive ability**

When looking at the trend of the young generation, one of the serious trends is low **Metacognitive ability**. That means the ability to perceive one's own cognitive state of things objectively and from a higher dimension. It refers to the ability to consciously perceive what you want to do.

With **Metacognitive skills**, you can:

- Self-monitoring yourself;
- Self-control;
- Appropriate goal setting and goal achievement, problem-solving, and improvement of judgment

Any person has Cognitive Bias. But there is a degree of difference, in surrounding circumstances and training. And a such person who can control it is a strong person in real meaning. Are you a strong person? ...No, and we are very common people. These are generally not possible for us.

And what about "Listening to another opinion"!? ...It is possible to listen to another opinion. And it may be possible. But some bias will have happened in your conscious.

Yes, this issue is very difficult. But this issue is directly affected to find facts, root causes, creation of Function deployment, Fault tree analysis, and FMEA. These activities are requested to avoid Cognitive Bias.

So, what can we do? ...My suggestion is as next:

- 1) **Dialogue in diversity and reading books: Be induced by another idea;**
- 2) **Idle walking, chattering, sunbathing: Brain relaxed;**
- 3) **Time absent-minded, simple repetitive work, power-nap and release physiological needs (including Excretion): Brain blank and openness;**
- 4) **Short exercise: Brain refreshment and blood circulation;**
- 5) **Good Gemba Human relation: To avoid bad mental stress in Gemba.**

What??? ...Are these same as **Thinking Environment**? Yes, these are. In my experience, the method of avoiding **Cognitive Bias** is the same as the 5 rules of thumb.

I believe you can do and you should do it.

## IV. Next Lecture.

Next, I'll describe the TQM method (TQM Hardware) one by one.



*TQM-3 TQM-Hardware,  
TQM- Software & TQM-  
Diagnose [eng]*

The contents of TQM Hardware are as next (From TQM-3<sup>17</sup>): 7 QC tools, QC Circle, Kaizen Process Diagram, Potential Problem Matrix, QCPD (Quality Control Process Diagram), FMEA, QA Matrix, Function Deployment, IPQC (Initial Products Quality Control), QRQC (Quick Response Quality Control), Taguchi method and KJ method.

And next, I again write the KJ Method.

Also, I will write Cost control-7 which I omitted at this time, because of the pages. And the continuation from TQM-3 of Teaching Company.

**Koichi Kimura, CC4 – May – 2023.**

**Factory Management Institute**

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<sup>17</sup> **TQM-3** [eng]: <https://archive.org/details/tqm-3-hardware-software-diagnose-cost-reduction-6>  
[esp]: <https://archive.org/details/tqm-3-hardware-software-diagnose-cost-reduction-6>